

# Caribbean pygmy jumping leaves (Tetrigidae, Cladonotinae, Choriphyllini)

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## Abstract

The tribe Choriphyllini Cadena-Castañeda & Silva, 2019 consists of only two genera, *Choriphyllum* Serville, 1838 and *Phyllotettix* Hancock, 1902b, combining leaf-like Caribbean wide-nosed pygmy grasshoppers (Tetrigidae, Cladonotinae). The genus *Choriphyllum* has four species, *C. bahamense* Perez-Gelabert & Otte, 1999 from the Bahamas (Hummingbird Cay Island), and *C. sagrai* Serville, 1838, *C. saussurei* Bolívar, 1887 and *C. wallaceum* Skejo, Kasalo & Yong, **sp. nov.** from Cuba. The gender of *C. bahamensis* is changed to *C. bahamense* in order to match the grammatical gender of the genus, which is neuter. Silva's designation of *C. sagrai*, the type species of *Choriphyllum*, as nomen dubium in 2019 was incorrect as Serville's drawing clearly points to this species, endemic to Cuba, so nothing about its identity is doubtful. The genus *Phyllotettix* is endemic to Jamaica, where four species live: *P. rhombeus* (Felton, 1765), *P. foliatus* (Hancock, 1902a), *P. compressus* (Thunberg, 1815) and *P. plagiatus* (Walker, 1871), **comb. nov.** of *Choriphyllum plagiatus*. *Choriphyllum westwoodi* Hancock, 1902a, **syn. nov.** is synonymous with *Phyllotettix rhombeus* and not with *P. compressus*. A new subgenus is established, *Phyllotettix (Rhombotettix)* **subgen. nov.** for *P. (R.) plagiatus* **comb. nov.** and *P. (R.) rhombeus*. A new species complex, *Phyllotettix (compressus)* **sp. complex nov.** is established for two morphologically close species, *P. compressus*, and *P. foliatus*; while another new species complex, *Choriphyllum (sagrai)* **sp. complex nov.** includes *C. sagrai* and *C. wallaceum* **sp. nov.** An annotated key to genera, subgenera, species groups and species is provided.

## Key Words

Alfred Russel Wallace, Bahamas, complex, *Choriphyllum*, Cuba, iNaturalist, Jamaica, new species, *Phyllotettix*, revision, species group, subgenus, synonym

## Introduction

Wide-nosed pygmy grasshoppers (Tetrigidae, Cladonotinae) include species of rather unique morphology, but their taxonomy was pretty chaotic till recently (Tumbrinck 2014). With the photographs of the name-bearing specimens becoming publicly available online on websites such as Orthoptera Species File (Cigliano et al.

2022), it is becoming easier to assess the taxonomy of old species and to identify new records.

The tribe Choriphyllini was established recently (Silva et al. 2019) to gather all leaf-like Cladonotinae from the Caribbean region. The tribe includes only two genera, *Choriphyllum* Serville, 1838 and *Phyllotettix* Hancock, 1902b, currently with three and four species, respectively. Starting with the description of *P. rhombeus*

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(Felton, 1765), one of the oldest Tetrigidae species from the standpoint of nomenclature, originally described as *Cicada rhombea* and all the way up to the review by Silva et al. (2019), the members of this group went through numerous taxonomic changes and some challenges have persisted up to today. The aim of this study is to establish a firm starting point for any future work on the tribe Choriphyllini. This is done through an extensive literature overview, a critical re-examination of the data and thoroughly-discussed taxonomic changes.

## Materials and methods

Original descriptions (Serville 1838; Bolívar 1887; Hancock 1902a, b; Perez-Gelabert and Otte 1999) of all the species were consulted and type specimens (or photographs of type specimens) of all the described species were examined. Previous synonymisation (Kirby 1910) and nomen dubium designation (Silva et al. 2019) were re-checked and are discussed. A new record of *Phyllotettix compressus* (Thunberg, 1815) from iNaturalist and new records of *Choriphyllum sagrai* Serville, 1838 from the field and from museum collections are included. One new species is proposed, *C. wallaceum* Skejo, Kasalo & Yong, sp. nov. from Cuba, based on a male holotype from MNCN. Taxonomy follows the recent classification of Cladonotinae used in the Orthoptera Species File (Silva et al. 2019; Cigliano et al. 2022; Deranja et al. 2022). Terminology and measurements follow Devriese (1999) and Tumbrinck (2014), except that we introduce the term *capital sinus* for the sinus between the anterior projection of the pronotal crest and the lateral vertical edge of prozona/paranota (see Fig. 3). The most important taxonomic character in *Choriphyllum* and *Phyllotettix* is the shape and undulation of the pronotal crest, i.e. (a) the shape of the anterior projection, (b) the position of the highest point and (c) the shape of the pronotal tip.

The measurements were made using the ImageJ (v. 1.53t) software (Schneider et al. 2012). The information on the size of the specimens represented by drawings in Westwood (1839) was deduced using the information in the text (8 lines = 18 mm).

For each genus, we propose a vernacular name, list synonyms and type species and present composition, distribution and a brief generic diagnosis. For the new subgenus, we designate the type species, propose vernacular names and present composition, distribution and brief diagnoses. We define a species group as a category containing species with many similarities, but also with enough differences that make synonymisation impractical without more evidence; the specific status of each species is preserved and their close relationships are reflected by the groupings. For each species group, we propose a vernacular name and provide annotated distribution data and a brief diagnosis. For each species, we propose a vernacular name, present detailed taxonomic and nomenclatural history, information on type specimens and new records, annotated distribution data and a brief diagnosis.

Museum abbreviations are listed as follows:

<b>ANSP</b>	Academy of Natural Sciences, Philadelphia, Pennsylvania, USA;
<b>BMNH</b>	The Natural History Museum [British Museum of Natural History], London, UK;
<b>FSCA</b>	Division of Plant Industry, Florida State Collection of Arthropods, Florida, USA;
<b>FZ</b>	Fernando de Zayas private collection (formerly at Havana, Cuba, current whereabouts unknown);
<b>IES</b>	Instituto de Ecología y Sistemática, La Habana, Cuba;
<b>MfN</b>	Museum für Naturkunde, Berlin, Germany;
<b>MHNG</b>	Muséum d'Histoire Naturelle, Geneva, Switzerland;
<b>MNCN</b>	Museo Nacional de Ciencias Naturales, Madrid, Spain;
<b>MNHN</b>	Muséum national d'Histoire naturelle, Paris, France;
<b>MNHNC</b>	Museo Nacional de Historia Natural Cubana, Havana, Cuba;
<b>OSF</b>	Orthoptera Species File; SY – Personal collection of Sheyla Yong, Havana, Cuba;
<b>UZI</b>	Uppsala University, Uppsala, Sweden.

## Results

### Taxonomy

#### Family Tetrigidae Rambur, 1838

#### Subfamily Cladonotinae Bolívar, 1887

#### Tribe Choriphyllini Cadena-Castañeda & Silva, 2019

Vernacular name: Caribbean Pygmy Jumping Leaves

**Type genus.** *Choriphyllum* Serville, 1838, type species *C. sagrai* Serville, 1838.

**Composition and distribution** (Figs 1, 2). Two genera; *Phyllotettix* with four species endemic to Jamaica and *Choriphyllum* with three species endemic to Cuba and one species endemic to the Bahamas. The genus *Phyllotettix* is herewith divided into two subgenera (nominotypical *Phyllotettix* and new *Rhombotettix* subgen. nov.).

#### Genus *Choriphyllum* Serville, 1838

Vernacular name: Caribbean Pygmy Dancing Leaves

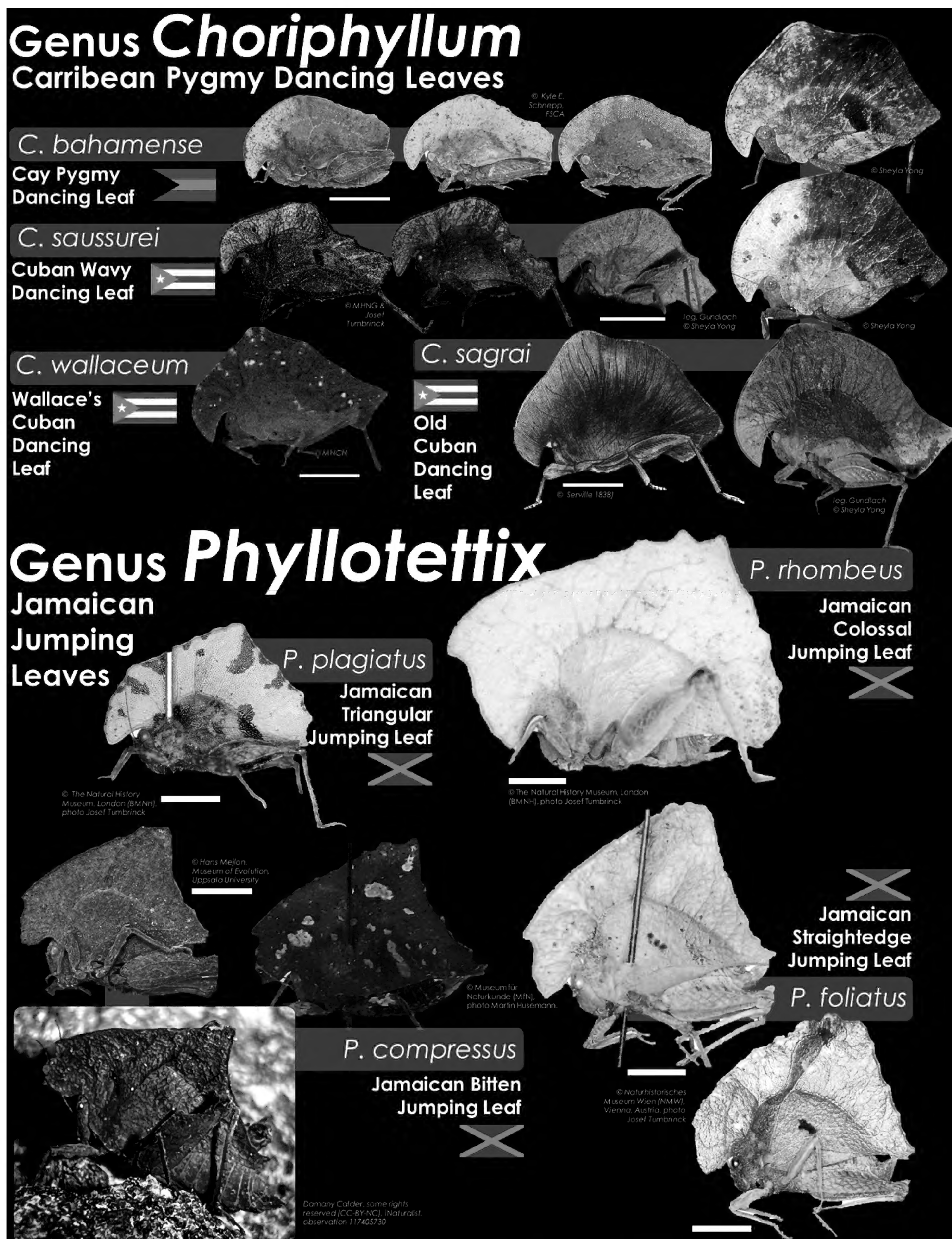
= *Chloriphyllum* Scudder, 1869.

= *Chorophyllum* Fieber, 1845.

**Type species.** *Choriphyllum sagrai* Serville, 1838.

**Composition and distribution** (Figs 1, 2). The genus *Choriphyllum* contains four species. *Choriphyllum bahamense* Perez-Gelabert & Otte, 1999 is endemic to the Bahamas (Hummingbird Cay Island), while *C. sagrai*



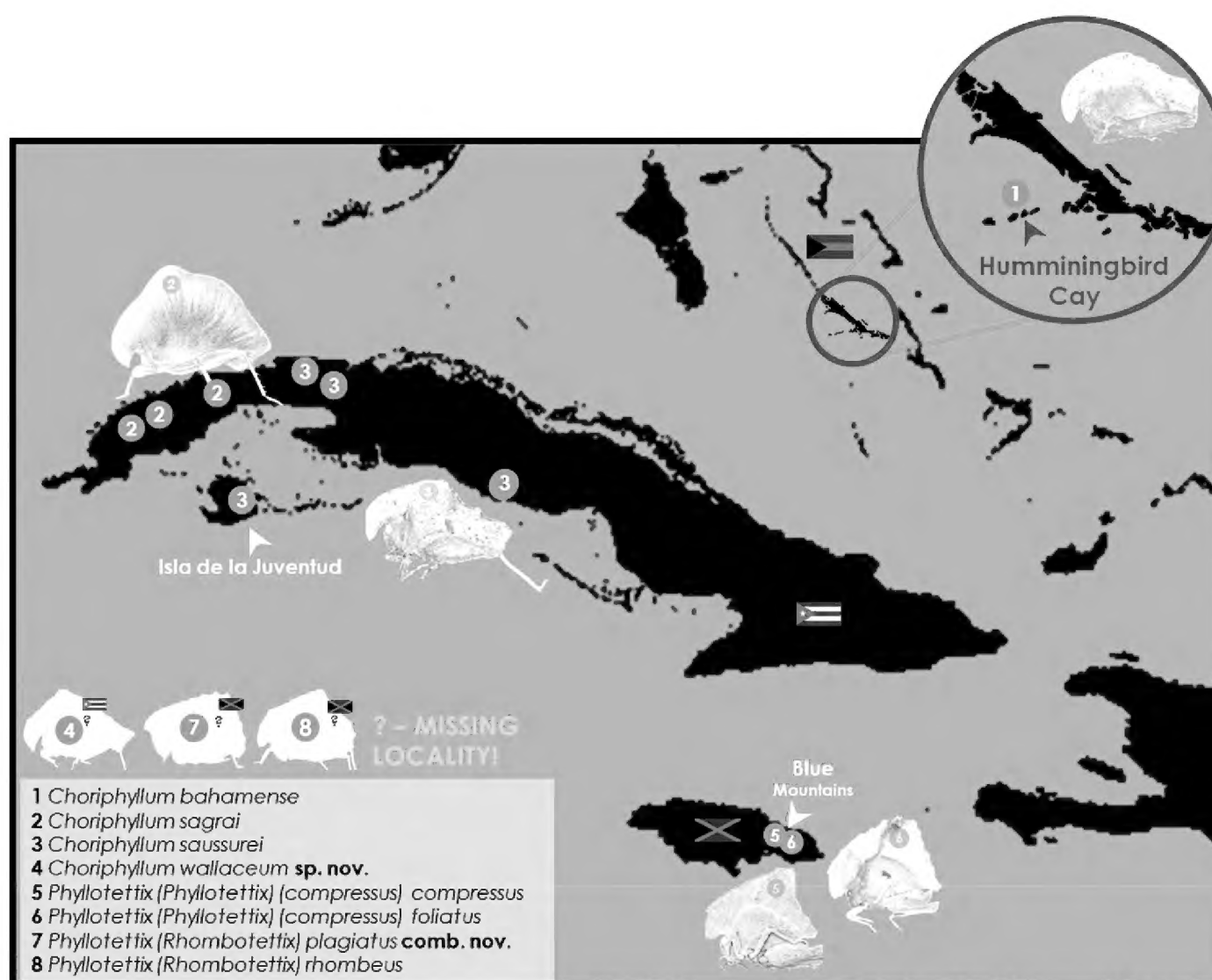


**Figure 1.** Diversity of the Caribbean Pygmy Jumping Leaves, tribe Choriphyllini, genera *Choriphyllum* and *Phyllotettix*. All the specimens with available photographs are shown, representing the first variability assessment for the species of these genera. The scale bar represents 5 millimetres.

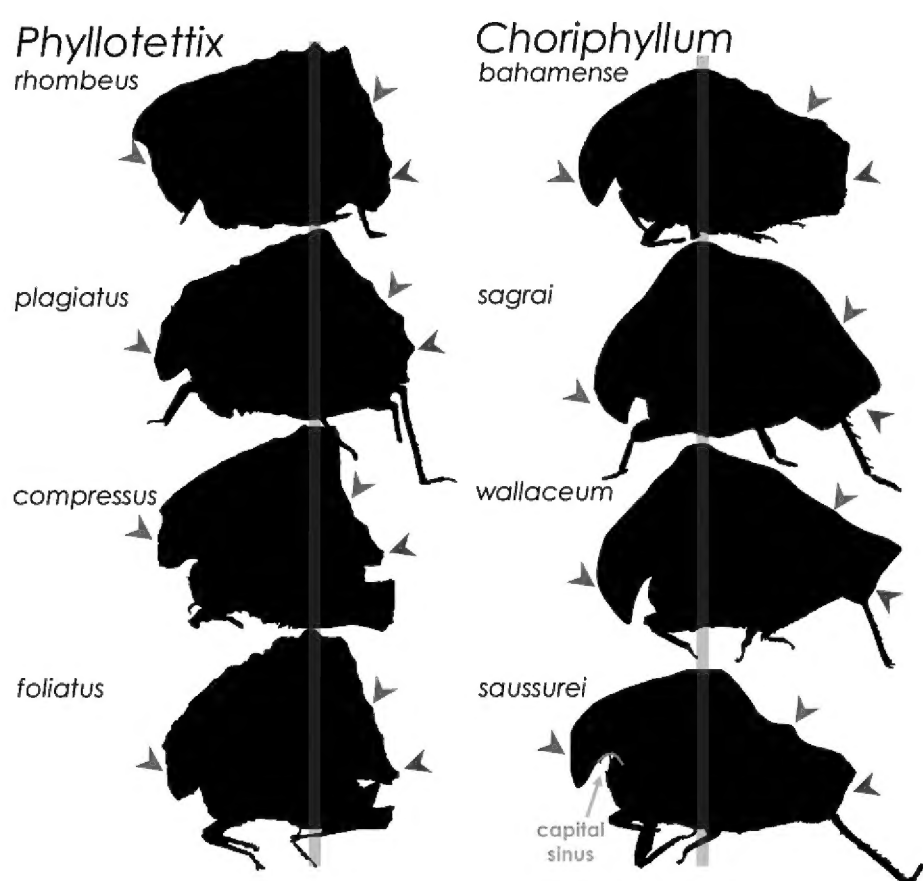
Serville, 1838, *C. wallaceum* sp. nov. and *C. saussurei* Bolívar, 1887 are found only in Cuba.

**Diagnosis** (Figs 1, 3). The anterior margin of the pronotum is smooth (undulated in *Phyllotettix*). The capital sinus is long, deep and narrow. The highest point of the

pronotum is before the middle or in the middle of the pronotum length (behind the middle in *Phyllotettix*). Apex of the pronotum strongly truncated (oblique in *Phyllotettix* (*Rhombotettix*) subgen. nov. or sharp in *Phyllotettix* (*Phyllotettix*) members).



**Figure 2.** Biogeography of the Caribbean Jumping Leaves (Cladonotinae, Choriphyllini). Biogeographic data of the tribe Choriphyllini is scarce. The distribution map of the six species belonging to this leaf-like tribe has the distribution of three species missing, as no localities are known.



**Figure 3.** Annotated schematic pictorial key to genera and species of Choriphyllini. Specimens are not to scale; for size comparison see Fig. 1. The red line shows the position of the highest point of the pronotal crest. The blue arrow points to the anterior margin of the pronotum; the green arrow points to the posterior pronotal tip; and the purple arrow points to the caudal margin of the pronotal crest. Shown are silhouettes of the type specimens of each species. For *C. sagrai*, shown is the silhouette of Serville's (1838) drawing of the holotype. The capital sinus is marked in red and pointed out in grey.

### *Choriphyllum bahamense* Perez-Gelabert & Otte, 1999

Vernacular name: Cay Pygmy Dancing Leaf

*Choriphyllum bahamensis* Perez-Gelabert & Otte, 1999: 454 (original description and type drawings); Silva et al. 2019: 3, 6, 9–12, 35 (information on types; identification key, type photographs) (Note! *Choriphyllum* is of neuter gender, so the correct specific epitheton should be “*bahamense*” which agrees in gender with the genus). Taxonomic and nomenclatural history.

**Type locality.** THE BAHAMAS: B. W. I. Exuma: Hummingbird Cay W of Georgetown (Perez-Gelabert and Otte 1999).

**Type specimens. Holotype.** THE BAHAMAS • 1 ♂; Exuma: Hummingbird Cay W of Georgetown; 12 Jun 1968; B. K. Dozier leg.; FSCA. **Paratype.** THE BAHAMAS • 1 ♀; Exuma: Hummingbird Cay W of Georgetown; 12 Jun 1968; B. K. Dozier leg.; FSCA.

**Distribution** (Fig. 2). Known only from the type locality, small Hummingbird Cay Island (Perez-Gelabert and Otte 1999; Silva et al. 2019). Due to the very small area of occupancy and extent of occurrence, as well as the affinity towards the rainforest habitat, the species might be endangered, but this has to be assessed through field-work. There are no new records since the description.

**Diagnosis** (Figs 1, 3). *Choriphyllum bahamense* can be differentiated from its congeners by: (1) the caudal tip of the pronotum which reaches the tips of the hind knees,



but not beyond (reaches behind the hind knees in *C. (sagrai)*), (2) the shape of the caudal tip of the pronotum which is excised vertically (in *C. (sagrai)* and *C. saussurei* excised at an angle) and (3) the moderate concave slope of the caudal margin of the crest (in *C. (sagrai)* the crest is higher, convex and sharply sloped and, in *C. saussurei*, it is lower and concave, but more sharply sloped, with a strong undulation).

**Measurements.** See Table 1.

### *Choriphyllum (sagrai) complex nov.*

Vernacular name: Cuban Complex Dancing Leaves

**Composition and distribution.** The complex includes two morphologically similar species, *C. sagrai* and *C. wallaceum* sp. nov., endemic to Cuba.

**Diagnosis** (Figs 1, 3). Members of the *Choriphyllum (sagrai)* complex can be differentiated from their congeners by: (1) the caudal tip of the pronotum which reaches beyond the hind knees (reaches the tips of the knees in *C. bahamense* and *C. saussurei*), (2) the shape of the caudal tip of the pronotum which is excised at an angle (excised vertically in *C. bahamense*) and (3) the high, convex and sharply sloped crest (in *C. saussurei*, it is low, concave, sharply sloped and bears an undulation and in *C. bahamense*, it is of medium height, concave and moderately sloped, without an undulation).

### *Choriphyllum (sagrai) sagrai* Serville, 1838

Vernacular name: Old Cuban Dancing Leaf

*Choriphyllum sagrai* Serville, 1838: 755 (description, type locality Cuba, holotype drawing). Taxonomic and nomenclatural history.

*Hymenotes sagrai* Serville; Westwood 1839: 493–494 (Serville's description and drawing).

*Hymenotes sagrai* Westw.; Scudder 1869: 41 (listed in the catalogue);

*Hymenotes sagrae* Serville; Stål 1873: 154 (comparison with *Hymenotes compressus* Thunb.).

*Choriphyllum sagrae* Serv.; Bolívar 1887: 203 (re-description, listed in the catalogue); Bolívar 1888: 146 (listed in the catalogue); Gundlach 1891: 346 (re-description and new records, "He cogido esta especie en Rangel (Vuelta Abajo)").

*Phyllonotus sagrai* Serv.; Hancock 1902a: 45 (included in the key, re-description provided).

*Choriphyllum sagrai* Serville; Hancock 1907: 12 (listed in the catalogue); Otte 1997: 14 (listed in the catalogue); Yong and Perez-Gelabert 2014a: 406 (listed in the checklist); Yong and Perez-Gelabert 2014b: 131 (listed in the catalogue); Silva et al. 2019: 4, 6–9 (types not found, regarded as *nomen dubium*, but listed as valid in the key).

**Type locality.** Cuba, without specified location (Serville 1838).

**Type specimens.** Type specimen likely deposited at MNHN but has not been found yet. **Holotype** of *Choriphyllum sagrai* known from Serville's (1838) drawing

(Figs 1, 3 silhouette), which undoubtedly shows a species found and photographed in Cuba by Sheyla Yong (Fig. 1);

**Other specimens.** CUBA • 3 ♀; Pinar del Río Province, Viñales Municipality; 22 May 2015; R. Teruel and T. M. Rodríguez-Cabrera leg.; SY. (Figs 1, 6, individuals in natural environment)

CUBA • 1 ♀ Gundlach leg.; MNHNC.

CUBA • 3 ♀; Artemisa Province, Sierra del Rosario, Rancho Mundito; 4 Jun 1947; F. de Zayas and J. Ferrás leg.; FZ.

CUBA • 1; Pinar del Río Province, Guane Municipality, Paredones; Aug 1969; F. de Zayas leg.; FZ.

CUBA • 4 ♀, 3 ♂, 1; Artemisa Province, Sierra Rangel; Jul-Aug 1930; Hermano Roberto leg.; on leaf litter in coffee plantation; IES.

CUBA • 1 ♂; Artemisa Province, Sierra Rangel, las Ánimas; 1,500 ft. (457 m) a.s.l.; May. 1933; Bruner and Otero leg.; IES.

CUBA • 1; Artemisa Province, Sierra Rangel; 5 Sep 1934; Bruner and Otero leg.; IES.

CUBA • 1 ♀; Artemisa Province, San Cristóbal Municipality, Aspiro; Mar 1955; P. Alayo leg.; IES.

**Distribution** (Fig. 2). The Old Cuban Dancing Leaf inhabits Cuba, where it was found in several localities (Aspiro, Sierra Rangel, Sendero las Maravillas and Paredones) (Gundlach 1891, this study). This species is endemic from the westernmost Cuba.

**Diagnosis** (Figs 1, 3, 7). The highest region of the pronotal crest is rounded (shaped as a slanted plateau, more angular in *C. wallaceum* sp. nov.). Anterior to the highest point, with a long, but shallow depression (with very low undulations in *C. wallaceum* sp. nov.). Posterior to the highest point, the crest with a well-expressed convexity, semicircular (sloping down in an almost straight fashion in *C. wallaceum* sp. nov., with weak undulations). Legs are generally smoother than in *C. wallaceum* sp. nov.

**Comments.** The identity of the species is not questionable (See Figs 1–3, 7).

**Measurements.** See Table 1.

### *Choriphyllum (sagrai) wallaceum* Skejo, Kasalo & Yong, sp. nov.

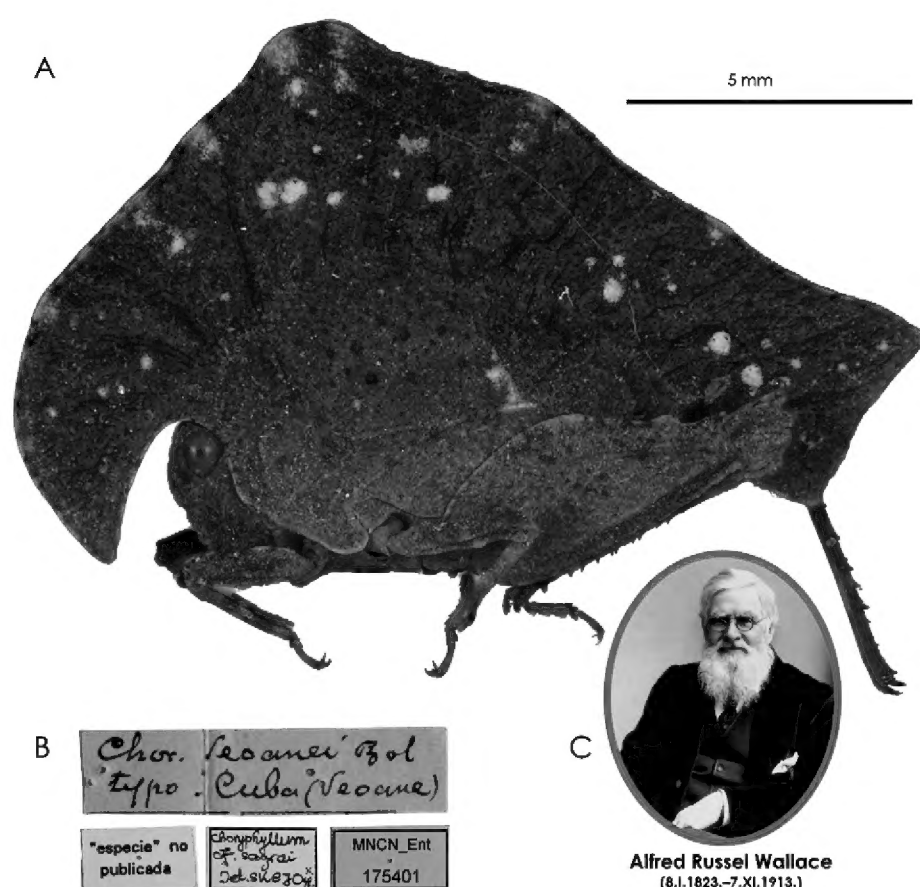
<https://zoobank.org/12F80ABE-9ECE-4E86-BB64-644D06874C72>

Vernacular name: Wallace's Cuban Dancing Leaf

"*Choriphyllum seoanei*", not published "new species" by Bolívar (Paris 1994: 255). Taxonomic and nomenclatural history.

**Etymology.** Named after Alfred Russel Wallace, the father of biogeography, modern evolutionary thought and a contributor to many fields of biology. The species name is a neuter gender adjective, second Latin declension, derived from Wallace, i.e. *wallaceus*, *wallacea*, *wallaceum*. The specific epithet celebrates the 200<sup>th</sup> anniversary of Alfred Russel Wallace birth (8 January 1823).

**Type locality.** Cuba, no specific location/s known.



**Figure 4.** Wallace's Cuban Pygmy Dancing Leaf, holotype male from MNCN photo M. París (A), its labels (B) and a photograph of Alfred Russel Wallace (C) after whom the new species was named.

**Type specimen.** *Holotype* of *Choriphyllum wallaceum* Skejo, Kasalo & Yong, sp. nov. CUBA • 1 ♂; No specified locality, labels under the specimen: 1<sup>st</sup> handwritten by Bolívar “*Chor. Seoanei* Bol Typo. Cuba (Seoane)”, 2<sup>nd</sup> label printed by París “especie no publicada”, 3<sup>rd</sup> label handwritten by Skejo “*Choriphyllum* cf. *sagrai* det. Skejo X.2018.”, 4<sup>th</sup> label is the catalogue number printed by MNCN “MNCN\_Ent175401” (MNCN).

**Distribution (Fig. 2).** Wallace's Cuban Dancing Leaf lives in Cuba, but the specific location is still not known.

**Diagnostic description (Figs 1, 3, 4).**

**Head.** Same as in other members of the tribe. Convex bulging vertex, frontal costa forks into a wide scutellum below half the height of the eye, upper margins of antennal grooves at the level of the bottom margin of the eyes.

**Pronotum.** General shape close to that observed in *C. sagrai*, but visibly more angular. The highest region of the pronotal crest is above the humeral angles and is shaped as a slanted plateau (rounded in *C. sagrai*). Anterior to the highest point, the crest slopes down with barely perceptible undulations (a long, but shallow depression present in *C. sagrai*). Posterior to the highest point, the crest slopes down with slight undulations (one well-expressed convexity in *C. sagrai*).

**Legs.** Anterior femora a little expanded proximally, bearing a tubercle at the middle of the ventral margin. Middle femora with slightly undulated margins, ventral margin with a slight tubercle at the distal third of its length. Hind femora robust, dorsal margin elevated in the anterior half and sloping down towards the knee; one moderate protrusion before the antegenicular tooth. Antegenicular tooth moderately expressed, genicular tooth strongly expressed. Legs are generally rougher than in *C. sagrai*.

**Note.** The diagnostic description presented here implies that the diagnostic criteria of higher taxa that encompass this species apply as well and are, thus, considered sufficient to differentiate *C. wallaceum* sp. nov. from other species.

**Measurements.** See Table 1.

***Choriphyllum saussurei* Bolívar, 1887**

Vernacular name: Cuban Wavy Dancing Leaf

*Choriphyllum saussurei* Bolívar, 1887: 203–204 (original description, type locality Cuba, and holotype drawing); Bolívar 1888: 146 (listed in the catalogue); Gundlach 1891: 347 (new records and habitat observation, “He encontrado esta especie en la Isla de Pinos y en Trinidad, en la Montaña debajo de hojarasca.”). Taxonomic and nomenclatural history. *Phyllonotus saussurei* Bol.; Hancock 1902a: 45–46 (included in the key, re-description provided).

*Choriphyllum saussurei* Bolívar; Hancock 1907: 13 (listed in the catalogue, redrawn after Bolívar 1887); Kirby 1910: 6 (listed in the catalogue); Paris. 1994[1993]: 248 (status of the syntypes); Yong and Perez-Gelabert 2014a: 406 (listed in the checklist); Yong and Perez-Gelabert 2014b: 131–132 (listed in the catalogue); Hollier 2016: 27 (status of the syntypes in MHNG); Silva et al. 2019: 3, 5, 6, 9 (information on syntypes, included in the key, photographs of the type specimens).

**Type locality.** CUBA, without a specified location (Bolívar 1887; 1888).

**Type specimens. Syntype.** ♀ CUBA • Gundlach leg.; MNHNC.; **Syntypes.** CUBA • 2♀ M. H. de Saussure leg. MHNG. Syntypes from the MHNG on the OSF, <http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1100632>.

**Other specimens.** CUBA • 1 ♂; Sierra del Grillo; Apr 1969; P. Alayo leg.; IES.

CUBA • 1 ♀; Mayabeque Province, Jaruco Municipality, Escaleras de Jaruco; 9 Apr 1979; J. de la Cruz leg.; IES.

CUBA • 1 ♀; Isla de la Juventud Especial Municipality, Isla de Pinos, Punta del Este; 19 May 1974; L. F. de Armas leg.; IES.

**Distribution (Fig. 2).** The Cuban Wavy Dancing Leaf inhabits Cuba (Trinidad, Sierra del Grillo and Escaleras de Jaruco) and Isla de Pinos (Gundlach 1891, this study) where it can be found mostly in the mountains, where it dwells in the leaf litter (Gundlach 1891). This species is endemic from west-central Cuba.

**Diagnosis (Figs 1, 3).** *Choriphyllum saussurei* can be differentiated from its congeners by: (1) the caudal tip of the pronotum which reaches the tips of the hind knees, but not beyond (reaches behind the hind knees in *C. (sagrai)*), (2) the shape of the caudal tip of the pronotum which is excised at an angle (excised vertically in *C. bahamense*) and (3) the low, concave, sharply sloped caudal margin of the crest with a strong undulation (in *C. (sagrai)* the crest is higher, convex and sharply sloped and, in *C. bahamense*, it is higher, concave and moderately sloped).

**Measurements.** See Table 1.



**Genus *Phyllotettix* Hancock, 1902b**

Vernacular name: Jamaican Pygmy Jumping Leaves

= *Phyllonotus* Hancock, 1902a (preoccupied with *Phyllonotus* Swainson, 1833, Mollusca).

= *Zaphyllonotum* Caudell, 1909 (type species *Choriphyllum foliatum* Hancock = *Phyllotettix foliatus*).

**Type species.** *Acrydium compressum* Thunberg, 1815 (= *Phyllotettix compressus*).

**Composition and distribution (Figs 1, 2).** Four species are assigned to two subgenera, each with two species. The nominotypical genus includes *P. (P.) compressus* and *P. (P.) foliatus*, while the *Rhombotettix* subgen. nov. includes *P. (R.) plagiatus* comb. nov. and *P. (R.) rhombeus*. All species are endemic to Jamaica.

**Diagnosis (Figs 1, 3).** The anterior margin of the pronotum is undulated (smooth in *Choriphyllum*). The capital sinus is short, shallow and wide. The highest point of the pronotum is behind the middle (before the middle or in the middle in *Choriphyllum*). Apex of the pronotum oblique or sharp (strongly truncated in *Choriphyllum*).

**Subgenus *Phyllotettix* Hancock, 1902b**

**Type species.** *Acrydium compressum* Thunberg, 1815

**Composition and distribution (Figs 1, 2).** The nominotypical subgenus includes only two species, *P. compressus* (Thunberg, 1815) and *P. foliatus* (Hancock, 1902a). These two species are very similar and may represent (subspecies of) a single species. The two species are endemic to Jamaica.

**Diagnosis (Figs 1, 3).** In lateral view, the posterior margin of the pronotal crest is excised and/or convex (in *Rhombotettix* subgen. nov., it is obliquely projected and undulated); the pronotum caudally barely reaches the hind knees (reaching behind the hind knees in *Rhombotettix* subgen. nov.).

***Phyllotettix (compressus) complex* nov.**

Vernacular name: Jamaican Complex Jumping Leaves.

**Composition and distribution (Figs 1, 2).** The complex includes two very similar species, *P. compressus* and *P. foliatus*, which are endemic to Jamaica. The complex may include more undescribed species, but may also represent a single variable species whose variation has not been correctly assessed yet.

**Diagnosis (Figs 1, 3).** The tip of the pronotum does not reach behind the hind knees. Pronotum rectangular/rhomboid in shape. In lateral view, the anterior margin of the pronotum may be more or less undulated, while the posterior margin of the pronotal crest is excised or convex. The posterior tip of the pronotum is sharp.

***Phyllotettix (Phyllotettix) (compressus) compressus* (Thunberg, 1815)**

Vernacular name: Jamaican Bitten Jumping Leaf

*Acrydium compressum* Thunberg, 1815: 162 (description); Bolívar 1887: 203 (listed as a synonym of *Choriphyllum rhombeum*). Taxonomic and nomenclatural history.

*Hymenotes compressus* Thunb.; Stål 1873: 153.154 (re-description of Thunberg's specimen); Bolívar 1887: 203 (listed as a synonym of *Choriphyllum rhombeum*, synonymy not accepted here).

*Acridium compressum* Thunb.; Scudder 1901: 7 (listed in the catalogue);

*Phyllotettix Compressa* Thunb.; Kirby 1910: 6 (listed in the catalogue);

*Phyllotettix compressus* Thunberg; Silva et al. 2019: 4 6, 9, 3, 14, 35 (information on syntypes, included in the key, photographs of the type specimens).

*Phyllotettix westwoodi* Hancock; Kirby 1910: 5 (listed as a synonym of *Phyllotettix compressa*, synonymy here not accepted, see *Phyllotettix rhombeus* Taxonomic and nomenclatural history, Figs 5, 6).

**Type locality.** JAMAICA, without specified location (Thunberg 1815).

**Type specimens.** *Holotype* ♂ of *Acridium compressum*. JAMAICA • 1 ♂; UZIU. Holotype photographs are available on the OSF, <http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1100598>.

**Other specimens.** JAMAICA • 1 ♀; Blue Mountains; 18.054489°N, 76.600555°W; 14 May 2022; Damany Calder leg.; iNaturalist ID: 117405730. Four photographs are available at <https://www.inaturalist.org/observations/117405730>.

JAMAICA • 1 ♀; MfN.

**Distribution (Fig. 2).** Jamaican Bitten Jumping Leaf is endemic to Jamaica. Until recently, no specified localities were known, but now, after the iNaturalist observation of a living individual (<https://www.inaturalist.org/observations/117405730>), we know for sure that the species inhabits the Blue Mountains range NE of Kingston. *Phyllotettix foliatus* has been reported from the same mountain range (see below).

**Diagnosis (Figs 1, 3).** Very similar to *Phyllotettix foliatus*, which is a member of the same species group. Separated by the narrow and sharp highest point of the pronotum (wide and oblique in *P. foliatus*) and after it, the posterior margin of the pronotum is strongly convex (almost straight in *P. foliatus*).

**Measurements.** See Table 1.

***Phyllotettix (Phyllotettix) (compressus) foliatus* (Hancock, 1902a)**

Vernacular name: Jamaican Straightedge Jumping Leaf

*Choriphyllum foliatum* Hancock, 1902a: Plate I, (fig. 1), 42 (description, holotype drawing); Otte, D. 1979[1978]:38 (status of the types).

*Phyllotettix foliatus* Hancock, 1907: 12 (new combination, listed in the catalogue); Kirby 1910: 5 (listed in the catalogue); Bruner, L. 1910: 93–94 (listed in the catalogue); Günther 1938: 317 (Reported new

specimens, one male and 3 females from Jamaica; no specified locality; deposited in Museum Stettin and added notes on the variability: “Only one female resembles the figure given by Hancock (1902a). In the other two females, the highest point of the pronotal crest is more elevated in lateral view, with a width of 2 mm and 3.5 mm, respectively, slightly undulated at the top; and due to this elevation, the posterior margin of the pronotal crest is strongly undulated in the lateral view. (...) In the case of the male specimen, the pronotum is bluntly rounded and without convexity when viewed in profile. The antennae length of these animals is striking, 8 mm in the examined material”; Silva et al. 2019: 4, 9 (types not found in ANSP, included in the key). Taxonomic and nomenclatural history.

*Zaphyllonotum foliatum* Caudell, 1909:113 (mentioned in a new combination, type species of *Zaphyllonotum*).

**Type locality.** JAMAICA, without specified locality (Hancock 1902a).

**Type specimens.** *Holotype* ♀ of *Choriphyllum foliatum*. JAMAICA • 1 ♀; ANSP.

**Other specimens.** JAMAICA • 1 ♂; Blue Mountains, Hardwar Gap; 8 Dec 1925; C. W. O’Brien leg.; “feeding on lichens on tree trunks at night”; NMW. Photographs at the OSF, <http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1100602>.

**Distribution (Fig. 2).** The Jamaican Straightedge Jumping leaf inhabits Jamaica. No specified localities are known hitherto (Hancock 1902a; Silva et al. 2019). However, Josef Tumbrinck has uploaded photographs to the OSF (Cigliano et al. 2022) of two specimens from Hardwar Gap, Blue Mountains, collected by C. W. O’Brien, who noted that the species was found feeding on lichens on tree trunks at night. *Phyllotettix compressus* has been reported from the same mountain range (see above).

**Diagnosis (Figs 1, 3).** Very similar to *Phyllotettix compressus*, which is a member of the same species group. Separated from *P. compressus* by the wide and oblique highest point of the pronotum (narrow and angular in *P. compressus*) and after it, the posterior margin of the pronotum is almost straight or weakly convex (strongly convex in *P. compressus*).

**Measurements.** See Table 1.

**Subgenus *Rhombotettix* Skejo, Yong, Bogić & Kasalo, subgen. nov.**

<https://zoobank.org/5B5015BC-81B1-4F0D-9C46-41647E0C27F6>

**Type species.** *Cicada rhombea* Felton, 1765 = *Phyllotettix (Rhombotettix) rhombeus*.

**Etymology.** *Rhombotettix* is a noun of masculine gender made up of combining Latinised Ancient Greek words for rhombus (ῥόμβος, rhombos) and grasshopper (τέττιξ, tettix). This name was selected because of its prosody in the combination with the specific epitheton of the type species, “*rhombeus*”.

**Composition and distribution (Figs 1, 2).** The subgenus *Rhombotettix* subgen. nov. includes only two species, *P. plagiatus* (Walker, 1871) comb. nov. and *P. rhombeus* (Felton, 1765) and they are both endemic to Jamaica.

**Diagnosis (Figs 1, 3).** In lateral view, the posterior margin of the pronotal crest is obliquely projected and undulated (in the nominotypical subgenus, excised or convex); the pronotum caudally reaching behind the hind knees (not reaching the hind knees in the nominotypical subgenus).

***Phyllotettix (Rhombotettix) plagiatus* (Walker, 1871), comb. nov.**

Vernacular name: Jamaican Triangular Jumping Leaf

*Choriphyllum plagiatum* Walker, 1871: 845 (original description); Thomas 1873: 245 (brief re-description); Hancock 1907: 13 (included in the catalogue); Kirby 1910.: 6 (listed in the catalogue); Silva et al. 2019: 3, 6, 7 (status of the types, re-description, included in the key, holotype photograph). Taxonomic and nomenclatural history.

*Phyllonotus plagiatus* Hancock, 1902: 45–46 (included in the key, brief re-description).

**Type locality.** JAMAICA, without specified locality (Walker 1871).

**Type specimen.** *Holotype* of *Choriphyllum plagiatus*. JAMAICA • 1 ♂; BMNH. Photograph on the OSF, <http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1100630>.

**Distribution (Fig. 2).** The Jamaican Triangular Jumping Leaf is endemic to Jamaica, no precise localities are known.

**Diagnosis (Figs 1, 3).** Similar to *Phyllotettix (Rhombotettix) rhombeus*, but easily separated by the shape of the anterior and posterior margins of the pronotum, as seen in the lateral view. The most produced anterior part of the pronotum is just above the head, not the one on the dorsal margin as in *R. rhombeus*. The pronotal crest is tri-

**Table 1.** Comparative measurements of the Choriphyllini members. Measurements shown in the brackets were taken from the type specimen drawings. Note the huge size of *Phyllotettix rhombeus* pronotum. Abbreviations HT – holotype, PT – paratype, ST – syntype.

Species and specimen	Body length	Pronotal length	Pronotal height	Hind femur length
Genus <i>Choriphyllum</i>				
<i>C. bahamense</i> , HT♀	10.0 mm	12.3 mm	7.1 mm	6.1 mm
<i>C. bahamense</i> , PT♀	10.1 mm	13.6 mm	7.9 mm	6.6 mm
<i>C. bahamense</i> , PT♂	10.0 mm	11.9 mm	6.9 mm	5.7 mm
<i>C. (sagrai)</i> sp. complex nov.				
<i>C. (s.) sagrai</i> , HT♀	(10.8 mm)	18.0 mm	(11.0 mm)	(6.0 mm)
<i>C. (s.) sagrai</i> , GUNDLACH♀	9.9 mm	20.50 mm	12.9 mm	7.7 mm
<i>C. (s.) wallaceum</i> sp. nov HT♂	10.7 mm	16.05 mm	9.5 mm	6.4 mm
<i>C. saussurei</i> , ST♀	10.0 mm	13.0 mm	6.7 mm	6.0 mm
<i>C. saussurei</i> , ST♀	8.9 mm	12.0 mm	6.2 mm	6.0 mm
<i>C. saussurei</i> , GUNDLACH♀	8.1 mm	130 mm	7.4 mm	5.7 mm
Genus <i>Phyllotettix</i>				
Subgenus <i>Phyllotettix</i>				
<i>P. (P.) (compressus)</i> sp. complex nov.				
<i>P. (P.) (c.) compressus</i> , HT♂	12.1 mm	16.0 mm	11.2 mm	8.6 mm
<i>P. (c.) foliatus</i> , HT♀	16.0 mm	19.0 mm	(12.1 mm)	9.0 mm
<i>P. (c.) foliatus</i> , NMW♀	16.7 mm	21.7 mm	16.9 mm	9.7 mm
<i>P. (c.) foliatus</i> , NMW♂	13.8 mm	18.6 mm	13.4 mm	8.6 mm
Subgenus <i>Rhombotettix</i>				
<i>P. (R.) rhombeus</i> , HT♀	16.2 mm	28.8 mm	17.9 mm	11.0 mm
<i>P. (R.) plagiatus</i> , HT♂	11.6 mm	17.4 mm	11.1 mm	7.5 mm



angular in shape and gradually descends from the highest point towards the posterior tip of the pronotum.

**Measurements.** See Table 1.

***Phyllotettix (Rhombotettix) rhombeus* (Felton, 1765)**

Vernacular name: Jamaican Colossal Jumping Leaf

*Cicada rhombea* Felton, 1765: 55 (original description and holotype drawing). Taxonomic and nomenclatural history.

*Cicada rhombea* Backer.; Linnaeus 1767: 704–705 (listed in the catalogue); *Membracis rhombea* Linn.; Fabricius 1775: 675 (listed in the catalogue, brief description).

*Hymenotes rhombea* Fabricius; Westwood 1837: 130 (listed in the catalogue).

*Hymenotes rhombea* Felton; Westwood 1839: 492, 493, f. 1 (nec 2) (drawings, a new specimen reported) (Fig. 5).

*Acridium (Hymenotes) rhombeum* Baker.; de Haan 1843: 165 (included in the key, listed in the catalogue, short re-description).

*Hymenotes rhombea* Westw.; Scudder 1869: 41 (listed in the catalogue);

*Choriphyllum rhombeum* Baker; Walker 1871: 845 (listed in the catalogue, *Acridium compressum* and *Choriphyllum sagrai* wrongly listed as synonyms of *Choriphyllum rhombeum*).

*Choriphyllum rhombeum* Walk.; Thomas 1873: 245 (wrong identification of *Choriphyllum sagrai* or *C. saussurei*, as it is reported from Cuba and is cited to have the caudal portion of the pronotum slanted; Serville's collection).

*Choriphyllum rhombeum* L.; Bolívar 1887: 202–203 (included in the key and the catalogue, re-described); Günther 1938: 316 (briefly discussed);

*Choriphyllum westwoodi* Hancock, 1902a: Plate I (fig. 2), 42, 44 (included in the key, short re-description) (Note: even though *Choriphyllum westwoodi* was aimed to be a replacement name for *Acridium compressum*, the type specimen on which the new name was based belongs to *Phyllotettix rhombeus*) syn. nov. (Figs 5, 6).

*Phyllotettix rhombeus* (Baker.), Bruner 1910: 94 (listed in the catalogue, wrongly cited from Cuba based probably on misidentification by Thomas 1873); Steinmann 1969: 384 (listed in the catalogue).

*Phyllotettix rhombea* Linn; Kirby 1910: 4–5 (listed in the catalogue); Günther 1938: 317 (briefly discussed).

*Phyllotettix westwoodi* Hancock.; Bolívar 1887: 94 (listed in the catalogue, brief diagnosis).

*Zaphyllonotum westwoodi* Hancock; Caudel 1909: 113 (mentioned as a new combination of *Choriphyllum compressum*).

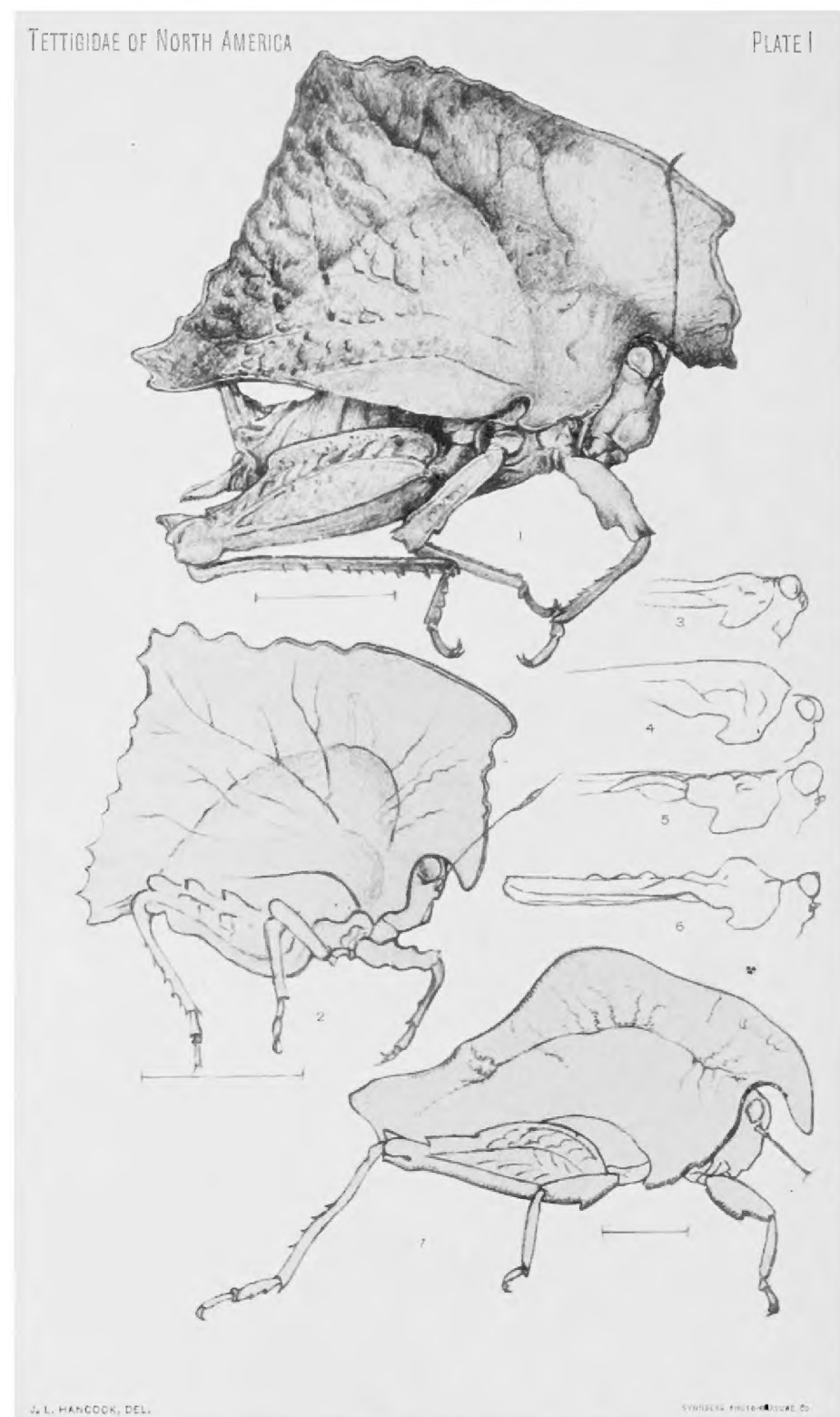
*Phyllotettix rhombeus* (Linnaeus, 1767) Silva et al. 2019: 4 (status of the holotype).

*Phyllotettix rhombeus* (Felton, 1765) Silva et al. 2019: 9, 14, 15 (status of the holotype, re-description, holotype photographs).

**Type locality.** JAMAICA, without specified locality (Felton 1765).

**Type specimens.** *Holotype* of *Cicada rhombea*. JAMAICA • 1 ♀; BMNH. Photograph on the OSF, <http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1100605>.

**Holotype** ♀ of *Choriphyllum westwoodi* (plate 1, fig. 2 in Hancock 1902a = *Hymenotes rhombea* depicted in fig. 67: 2, 2a, b in Westwood 1839) (probably in BMNH, but the locations of the specimens were not



**Figure 5.** Hancock's plate I from the "Tettigidae of North America" shows leaf-like Caribbean species under the numbers 1), 2) and 7), but has many taxonomic and nomenclatural errors. 1) – *Phyllotettix foliatus* (= female holotype of Hancock's *Choriphyllum foliatum*), 2) – *Phyllotettix rhombeus* (= Hancock's *Choriphyllum westwoodi*), 7) – *Choriphyllum saussurei*. (= Hancock's *Phyllonotus saussurei*). Source: Biodiversity Heritage Library, available at <https://www.biodiversitylibrary.org/item/25899#page/10>.

mentioned by Hancock (1902a) who established a new based on its appearance).

**Distribution (Fig. 2).** The Jamaican Colossal Jumping Leaf is endemic to Jamaica, but no precise localities are known. We can suppose that it still lives in the leaf litter of the Jamaican rainforests.

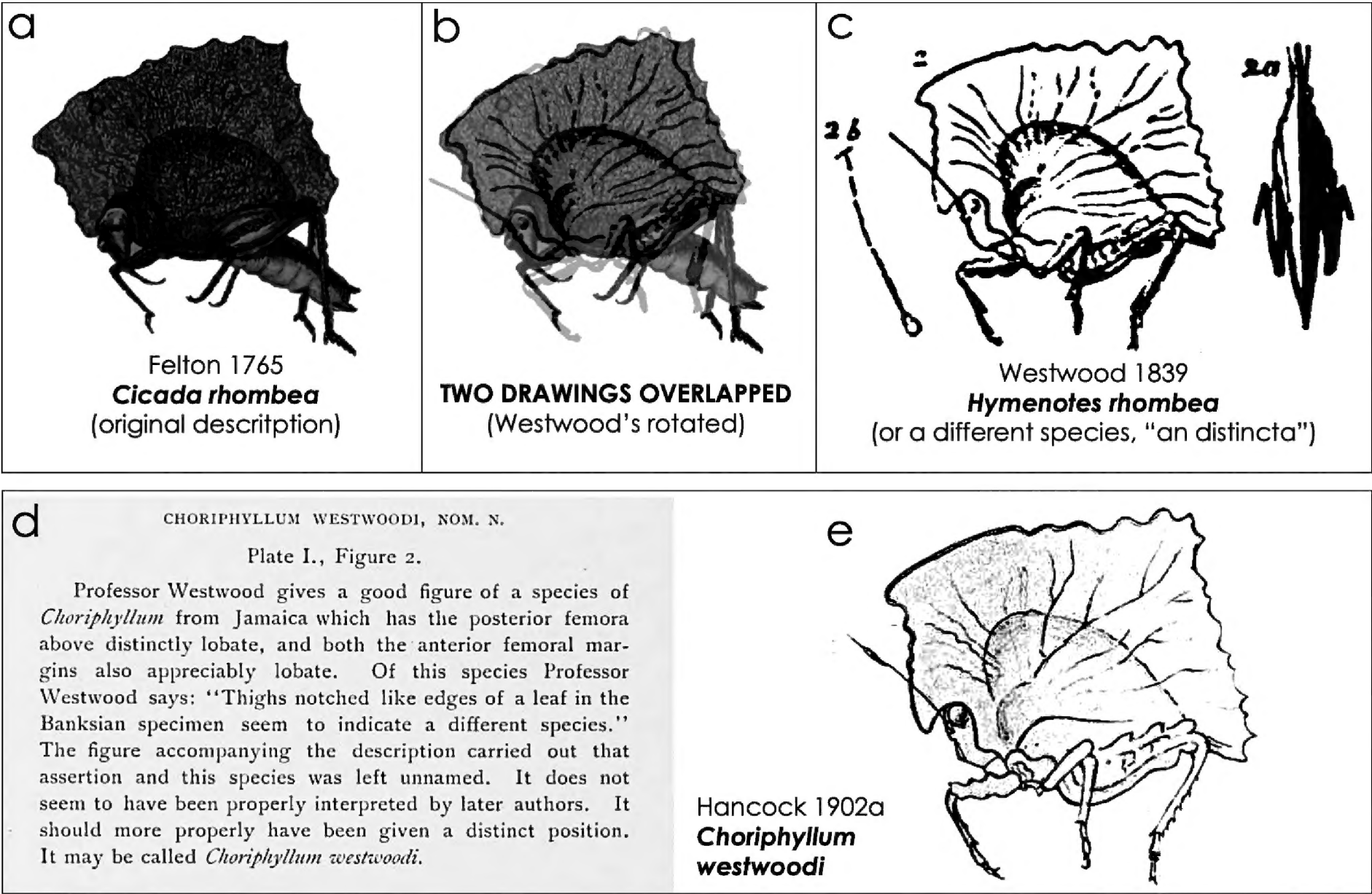
**Diagnosis (Figs 1, 3, 5, 6).** Similar to *Phyllotettix (Rhombotettix) plagiatus*, but easily separated by the shape of the anterior and posterior margins of the pronotum, as seen in the lateral view. The most anteriorly projected anterior part of the pronotum is not the one that hangs over the head, as in *R. plagiatus*, but the projection on the anterior portion of the pronotal crest. The pronotal crest is rectangular and abruptly falls towards the tip after its highest point.

**Measurements.** See Table 1.

Identification key to *Choriphyllini* genera, subgenera, species groups and species

See schematic pictorial key, Fig. 2.

- 1A Anterior margin of pronotum smooth. Capital sinus long, deep, and narrow. Highest point of pronotum in the middle or before the middle. Posterior tip of pronotum truncated. Cuba, the Bahamas..... genus *Choriphyllum* 2
- 1B Anterior margin of pronotum undulated. Highest point of pronotum behind the middle. Capital sinus short, shallow and wide. Posterior tip of pronotum oblique or sharp. Jamaica.....genus *Phyllotettix* 4
- 2A Tip of pronotum reaching the tips of the hind knees and excised in a straight fashion. The Bahamas, Hummingbird Cay Isl ..... *Choriphyllum bahamense*
- 2B Posterior margin of the pronotum in lateral view with one large undulation in the middle ..... *Choriphyllum saussurei*
- 2C Posterior margin of the pronotum in lateral view straight or semi-circular, without a notable undulation in the middle .. ..... *Choriphyllum (sagrai)* 3
- 3A In lateral view, pronotum more rounded, posterior margin of pronotum semicircular.....*Choriphyllum (sagrai) sagrai*
- 3B In lateral view, pronotum more angular, posterior margin of pronotum straight. *Choriphyllum (sagrai) wallaceum* sp. nov.
- 4A Posterior margin of pronotal crest excised and/or convex in lateral view. Pronotum caudally does not reach behind the hind knees .....Subgenus *Phyllotettix* 5
- 4B Posterior margin of pronotal crest obliquely projected and undulated in lateral view. Pronotum caudally reaches behind the hind knees .....*Rhombotettix* subgen. nov. 6
- 5A Highest point of pronotum narrow and sharp and after it, the posterior margin of the pronotum strongly convex .....  
.....*Phyllotettix (Phyllotettix) (compressus) compressus*
- 5B Highest point of pronotum wide and oblique and after it, the posterior margin of pronotum truncated or weakly convex..... *Phyllotettix (P.) (compressus) foliatus*
- 6A The most produced anterior part of the pronotum is not the one above the head, but the one above it. Pronotal crest rectangular in lateral view. Pronotum length > 25 mm .....*Phyllotettix (Rhombotettix) rhombeus*
- 6B The most produced anterior part of the pronotum is just above the head. The pronotal crest is triangular in lateral view. Pronotum length < 20 mm .....*Phyllotettix (R.) plagiatus* comb. nov.



**Figure 6.** The evidence of synonymy of *Choriphyllum westwoodi* Hancock, 1902a with *Phyllotettix rhombeus* (Felton, 1965); **A.** Felton's (1765) original drawing of *Cicada rhombea*; **B.** Felton's and Westwood's drawings of specimens of *Phyllotettix rhombeus* overlapped, showing they are almost identical; **C.** Westwood's (1839) drawing of a new record of *Hymenotes rhombea*; **D.** Hancock's (1902a) establishment of the name "*Choriphyllum westwoodi*"; **E.** Hancock's (1902a) drawing of *Choriphyllum westwoodi* can be regarded as type specimen designation. All specimens undoubtedly show *Phyllotettix rhombeus* (see Figs 1–3 for comparison).





**Figure 7.** Old Cuban Dancing Leaf (*Choriphyllum sagrai* Serville, 1838) in the natural environment amongst the leaf-litter in Cuba, photograph Sheyla Yong.

## Discussion

### World's largest tetrigid “comes home”

*Phyllotettix* (*Rhombotettix*) *rhombeus* (Felton, 1765), a species first assigned to *Cicada* (Felton 1765; Linnaeus 1767), then to *Membracris* (Fabricius, 1775), *Hymenotes* (Westwood, 1839), *Acridium* (de Haan 1843), *Choriphyllum* (Thomas 1873; Bolívar 1887), has just recently found its home amongst the members of the genus *Phyllotettix* (Bruner 1910; Silva et al. 2019). This is the first leaf-like tetrigid, described just 7 years after Linnaeus' 10<sup>th</sup> edition of *Systema Naturae* (Linnaeus 1758). There was a huge problem with the generic assignment and the authorship of *Phyllotettix rhombeus*. Even Silva et al. (2019: p4) incorrectly cited Linnaeus as the species' author in one place of their manuscript. Our study is the first one ever to consistently use the correct generic combination and the correct authorship, that being Felton 1765, not Linnaeus, Backer, Baker, Fabricius, Westwood or Walker (see taxonomic and nomenclatural history under the species).

The Jamaican Colossal Jumping Leaf indeed is a “colossus”. Its pronotal length reaches almost 3 cm and its height reaches almost 2 cm, making it the unrivalled world's largest Tetrigidae species known to date. The second largest is the Malagasy *Holocerus devriesei*, with a pronotum length of a little bit more than 2.5 cm (Skejo et al. 2020). This could be an example of island gigantism (e.g. Raia and Meiri (2006); Lokatis and Jeschke (2018)). Despite being the largest and the longest-known leaf-mimic pygmy grasshopper, nothing is known about the ecology or distribution of this extraordinary taxon from Jamaica. Except for its description, only one more specimen was reported (Westwood 1839; Hancock 1902a Plate I, fig. 2, as *Choriphyllum westwoodi*).

We assembled measurements by comparing those obtained from museum specimens with Westwood's (1839) drawings. We deduced information about the size of *Phyllotettix rhombeus* indirectly, as it was not cited directly

in Westwood's (1839) text. *Hymenotes triangularis* and *Choriphyllum sagrai* were drawn in visibly different sizes, but next to each of them was the same scale of 8 lines (= 18 mm). We concluded that the lines represent the relevant measure and compared the scale of the aforementioned species with the scale drawn next to *P. rhombeus*, which we determined to represent about 13 lines (= about 29 mm).

### Choriphyllini taxonomically sorted a little better than before

All the members of the tribe Choriphyllini are reviewed and a new subgenus (*Rhombotettix* subgen. nov.), new species groups/complexes (*Phyllotettix* (*P.*) (*compressus*) sp. complex nov.; *Choriphyllum* (*sagrai*) sp. complex nov.) and a new combination (*Phyllotettix* (*Rhombotettix*) *plagiatus* comb. nov.) are proposed in order to try to reflect the evolutionary history of this interesting taxon, as observed from morphological similarity. The species complex was established in order to clearly point out that the species included in it share many morphological characteristics and have extremely small differences, so it is not clear whether they have separate evolutionary histories.

*Choriphyllum sagrai* is not a *nomen dubium* (Silva et al. 2019), as Serville's (1838) description and drawings clearly match the species found in many localities in Cuba, some of them reported herewith. *Choriphyllum sagrai* was, however, hiding one secret, as the specimen identified some time ago by the first author as this species, deposited at the MNCN, was found to represent a separate species closely related to *C. sagrai*, *C. wallaceum* sp. nov., described in this study.

The newly-described species and the existence of *Choriphyllum bahamense* on the tiny and low island of Hummingbird Cay in the Bahamas imply that more *Choriphyllum* species are to be found in the future. The huge diversity of *Phyllotettix* in Jamaica, based on a few specimens only, provides even stronger evidence that we are still in the very beginning of understanding the Caribbean Pygmy Jumping Leaves.

Is the *Phyllotettix* (*Phyllotettix*) (*compressus*) complex only a single species or two or three closely related species? We can only speculate from four museum specimens, a drawing and a photograph of a living individual. Hence, at this moment, synonymisation or new species establishment would not bring any solution, but instead, introduce more chaos into an already loosely founded system. For *Phyllotettix* (*Rhombotettix*) *plagiatus* comb. nov. and *P. (R.) rhombeus* little can be said, as the holotypes, unfortunately, remain the only specimens from which information can be extracted.

The long history of this small tribe illustrates how mistakes accumulate when there is a lack of material which is badly handled as well. Previous authors did not all have the means to carefully examine the material or were unaware of its existence, leading to confusing synonymies (e.g. Hancock (1902a)). Silva et al. (2019) provided a good starting point for examining these



tetrigids, but overlooked some important data, leading to muddying of the taxonomy in some places, most notably in the case of *C. sagrai*. Well-discussed taxonomic acts, especially when dealing with making a taxon a synonym or a *nomen dubium*, are an absolute must in order to avoid future errors.

## Next steps in the Caribbean Pygmy Jumping Leaves research

A lot of the crucial information on the Caribbean pygmy jumping leaves is still lacking, despite the two-and-a-half-century-long research tradition (from Felton 1765 to Silva et al. 2019). This research tradition did not age well, so that data on the true species' distribution remains almost entirely absent. Scientists can still deal only with imprecise locality data for some species, such as “Jamaica” for *Phyllotettix* (*Rhombotettix*) *rhombeus* and *P. (R.) plagiatus* (Felton 1765; Westwood 1839).

Citizen scientists in the Caribbean should be encouraged to collect observations of these grasshoppers and consequently, the citizen science platforms, such as iNaturalist, should be regularly monitored by scientists in order to establish and maintain a continuous research practice. Such practice is already proven to work (e.g. Mesaglio et al. (2021); Connors et al. (2022)).

The aim of future research should be collecting more specimens, so our hypotheses on the species and their positions may be tested. Museum collections should be investigated as well to see whether there are more undocumented species/specimens. Fieldwork in the Caribbean region is necessary. Only fresh samples may provide a predisposition for the next step, an evolutionary study by means of molecular phylogeny. By bringing these charismatic critters to public attention and making their identification easier, we hope to foster a wider interest in them.

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